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pens," by W. P. Wilson; "A Nascent Variety of *Brunella vulgaris*," by J. T. Rothrock; and "Preliminary Observations on the Movements of the Leaves of *Melilotus alba* L. and Other Plants," by W. P. Wilson. Numerous new points are brought out by the studies of Dr. McFarlane on *Dionaea*. Among others he notes that two touches of the sensitive hairs are usually necessary to cause closure of the leaf. What he calls "memory power of the protoplasm," that is, response to a second stimulus when the first had no appreciable effect, he finds is sharply retained for from 30 to 45 seconds; and in from 55 to 60 seconds the effect of the first stimulus is lost. He also found that the hairs were not alone sensitive, although they were most so. But both outer and inner leaf surfaces show a marked degree of sensitivity. It was observed, likewise, that, although falling water, like rain, had little or no effect, immersion in water caused closure of the leaves as soon as the water touched the hair. Although three is the normal number of hairs on each blade of the leaf, our author has seen seven on one and six on the other half of a leaf; and he says leaves are frequently observed with from 8 to 13 hairs. "Such facts give countenance to the view that the sensitive hairs were once more numerous and diffuse in distribution, a condition still retained by *Drosera*." The hairs are jointed just above the base, and this seems to be the special irritable centre.

The epidermal cells of the leaves are stated to be admirable objects for observing the continuity of protoplasm. After proper treatment, the method being described, there are seen "along each side 18 to 30 protoplasmic bridges, which are slightly constricted on either side of the cellulose wall, and form a central swelling at the passage through the pore aperture. The transverse or oblique walls are traversed by 5 to 8 similar processes, so that the protoplasm of each epidermal cell is linked to that of neighbor cells by 50 to 75 fine connecting threads, and these again collectively are united with the cylinder of sensitive cells in the irritable hair." Various other subjects are considered, but they cannot be referred to here.

In the Bulletin of the Denison University, above mentioned,

we have a catalogue of 945 species of plants occurring in Licking County, Ohio. Mr. H. L. Jones, the author, gives a list of the herbaria consulted, a short sketch of the county geology, and other facts. Among them are the times of flowering of the plants, and we note that in November 44 species bloom, in December 11, in January 14, in February 9, in March 17, and up to July 530. Thus no month of the year is without some flowers.

JOSEPH F. JAMES

Washington, March 1.

An Introductory Manual for Sugar Growers. By FRANCIS WATTS, F.C.S., F.I.C. London and New York, Longmans, Green & Co. 151 p. Ill. 8°.

In the rapid extension of agricultural chemistry and scientific agriculture, a vast amount of tabular matter has been prepared, thousands of analyses have been made, and yet the results are neither satisfactory nor proportional to the work done. Professor Whitney has recently placed the position very clearly in saying, "There has been no satisfactory interpretation as yet of much of the work which has been done on the chemical composition of soils and plants, and the results of plat experiments have in most cases been very conflicting and uncertain." In this country the government experiment stations are issuing bulletin after bulletin of valuable and interesting reading; but even they, with all their superior advantages, have, as yet, fallen far short of their purpose. One reason for this is in the pre-eminence given to analysis and in the slighting of "condition," which latter feature forms a prominent part in the opening chapters of "An Introductory Manual for Sugar Growers," by Mr. Francis Watts, government chemist at Antigua, W. I. The first half of this interesting little book may be perused with profit by agriculturists the world over, presenting as it does a remarkably clear and intelligible dissertation on the elements of agricultural chemistry, treating first of soils, then of plant life and plant food, and finally of manures and fertilizers. The remainder of the work is devoted exclusively to the sugar industry, beginning with the planting and cutting of

CALENDAR OF SOCIETIES.

Anthropological Society, Washington.

Mar. 7. — George H. Boehmer, Pre-Historic Naval Architecture of Northern Europe; George R. Stetson, Mental Atrophy in the Working Classes.

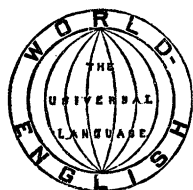
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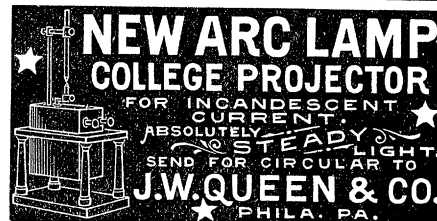
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the cane, and passing on in natural sequence to the mill, the treatment of the juice, the manufacture of the sugar, the testing of the sugar solutions, and finally to the molasses and fermentation.

Throughout, the book is one for the practical man, and much important detail has been embodied within its pages. One of the best chapters is that treating of "Condition or Heart," plant food, and drainage, the first constituting, as Mr. Watts says, "a large portion of the science of agriculture." Analyses are, of course, given, but they are not asked to do duty for the whole, as is often the case in agricultural treatises. It is interesting to note, too, the remarks upon the assimilation of atmospheric nitrogen by the Leguminosæ, in which Mr. Watts follows Berthelot. Schlösing and Laurent have, indeed, recently denied the fixation of nitrogen by the action of microbes beneath the surface of the soil, but their theory of chlorophyll action needs far greater proof than they have offered. Berthelot is a good leader. Chapter III. deals with the sugar cane, treating of the preparation of the land, the manner of manuring and weeding, the cutting of the cane, and the utilization of the trash. Chapter IV. is of general interest, though the facts are applied in a particular manner to sugar growing. The collection, retention, and value of pen manures, the application of green dressing and of chemical manures, including potash, phosphates, superphosphates, sulphate of iron, etc., forms together an interesting study. The fallacy, which is so common, of supposed increase in manurial value of the excreta as compared with the food eaten, is here spoken of, as is also in a previous chapter the practice of burning the trash under the impression that thereby its value as a fertilizer is increased.

In the chapter dealing with the mill and the extraction of the juice, the various types of the former are compared and diagrams given. The application of hydraulic attachment to the rolls is mentioned, and a comparison is made of the results from crushing and those obtained by maceration and diffusion. The succeeding chapters treat of the juice, tempering, clarifying, filter-

ing from the scum and the utilization of the latter, the manufacture of the sugar, in open pans, with strain, and in vacuum, and finally of the testing of the solutions and syrups. The production, composition, and uses of the molasses with the recovery of the sugar therefrom, and finally the nature of ferments and fermentation with the yield of alcohol and the forms of the stills employed, constitutes the subject matter of the concluding chapters. There are in addition tables of the temperature of steam at varying pressure, a list of the elements with their symbols and atomic weights, and a table of the densities, etc., of saccharine solutions.

We should be pleased to see this book in a second edition much enlarged and amplified, and trust that it is but the beginning of a series.

C. P.

AMONG THE PUBLISHERS.

SIR ROBERT S. BALL, F.R.S., the well-known English astronomer, has just completed an "Atlas of Astronomy," containing numerous beautifully printed telescopic views of planets, the sun's corona, etc., and diagrams of orbits. There are many star maps, and a series of twelve plates devoted to the moon, showing its aspects on consecutive days from the third to the fourteenth, making seventy-two plates in all. An introduction of nearly sixty pages gives a comprehensive explanatory text. The Atlas is published by D. Appleton & Co.

— Bulletin No. 40 of the United States National Museum is No. IV. of the Bibliographies of American Naturalists, published by the government. This one is by L. S. Foster, and gives the writings of the ornithologist, Geo. N. Lawrence. A portrait faces the title-page, and in the course of the 124 pages, 131 titles are enumerated. Under these titles are given all facts connected with them. The species given in each are enumerated, together with the locality and page. A very full index gives ready reference to any species mentioned.

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For exchange.—Will exchange an "Ideal" Microscope of R. and J. Beck, London, 2 eye pieces 3 objectives, 3 inch, 1 inch, 1-6 inch; bull's eye condenser on stand, substage condenser, mechanical stage, etc., for any of the leading makes of type writers. Particulars by mail. DELOS FALL, Albion College, Albion, Mich.

Sale, or exchange for similar material; Diatoms (Isthmia nervosa), unmounted, from San Francisco Bay. M. J. ELROD, Bloomington, Ill.

For sale or exchange.—I have a few copies of my translation of "Strasburger's Manual of Vegetable Histology, 1887," now out of print, which I will send post-paid for \$3 or for one dozen good slides illustrating plant or animal structure. Address A. B. Hervey, St. Lawrence University, Canton, N. Y.

The undersigned has the following specimens to exchange for crystals of any eastern or foreign localities or Indian relics: tin ore, metaclinnabarite, stibnite, garnierite, calenante, hanksite, ulexite, rubellite, lepidolite, blue and green onyx, Cal. pinelite, aragonite on chalcedony, cinnabar, double refracting spar, clear and clouded, and others. J. R. Bush, care of General Delivery, Los Angeles, Cal.

For sale or exchange.—A private cabinet of about 200 species of fossils, well distributed geologically and geographically. Silurian, about 40; Devonian, about 50; Carboniferous, about 80; others, about 30. Frank S. Aby, State University, Iowa City, Ia.

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